

★ THOM/ P36 93-347173/44 ★ GB 2266863-A
Marking landscape with paint or dye for sports field, car park, crops
- has several sprayheads arranged on boom, each having respective
solenoid operated valve under computer control which also controls
pattern e.g. raster

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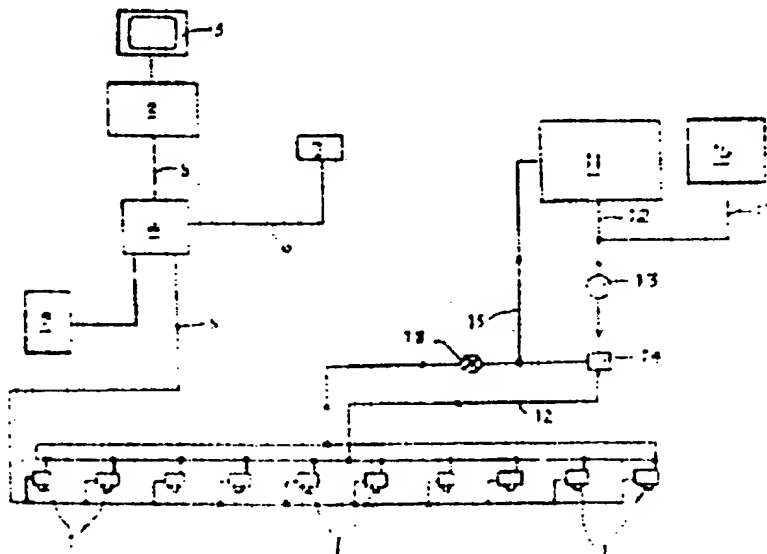
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B41J 2/01

The method of marking a landscape to provide a pattern thereon, involves traversing the landscape to be marked with nozzles (1) arranged to apply marking material thereto in a given sequence and operating the nozzles as they traverse the landscape to apply marking material thereto in sequence, to provide a predetermined pattern thereon.

The operation of the nozzles in a given sequence is controlled by a programmed or programmable control device, such as, a computer, for storing the predetermined pattern(s). The distance traversed by the nozzles is monitored, with the sequence in which marking material is applied to the landscape being dependent upon such monitored distance. The sprayer boom may be mounted on a tractor or vehicle. The distance of the nozzle movement can be monitored by a Doppler-type or radar sensor connected to the controller.

USE/ADVANTAGE - for applying marking material e.g. paint, dye to sport-fields such as sponsorship logo, parking lots etc. Also marking of vegetated areas by differential crop growth. Very large indicia may be created using raster. (17pp Dwg.No.1/2b)

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GB 2187419 A GB 2036645 A EP 0036295 A
US 4501038 A

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(54) Selective marking of large areas such as landscapes

(57) Method and apparatus for marking a landscape to provide a pattern thereon, comprising traversing the landscape to be marked with operable means (1) arranged to apply marking material thereto in a given sequence to provide a predetermined pattern thereon.

As described (Fig. 1) a plurality of sprayheads (1) are arranged on a boom or the like, each sprayhead having a respective valve under the command of a computer. Very large indicia may be created by passing the boom over the ground in a raster-like pattern.

The invention is described with respect to applying marking material (e.g. paint, dye) to sport-fields, parking lots, etc. but is not restricted thereto. The marking of vegetated areas by differential crop growth (either by differential sowing or by differential treatment of a single crop) is also envisaged.

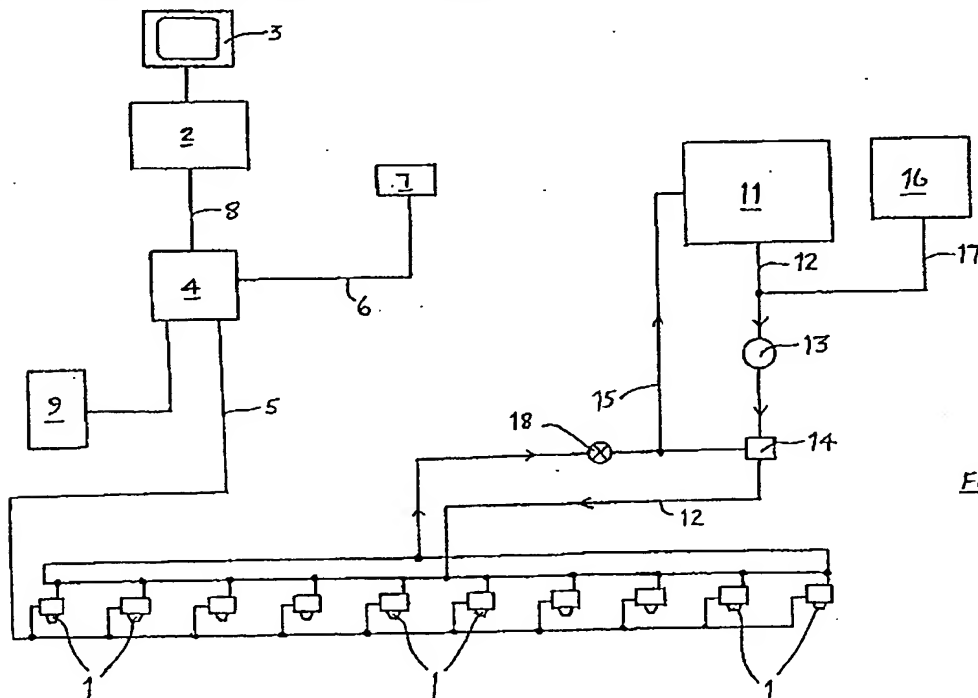
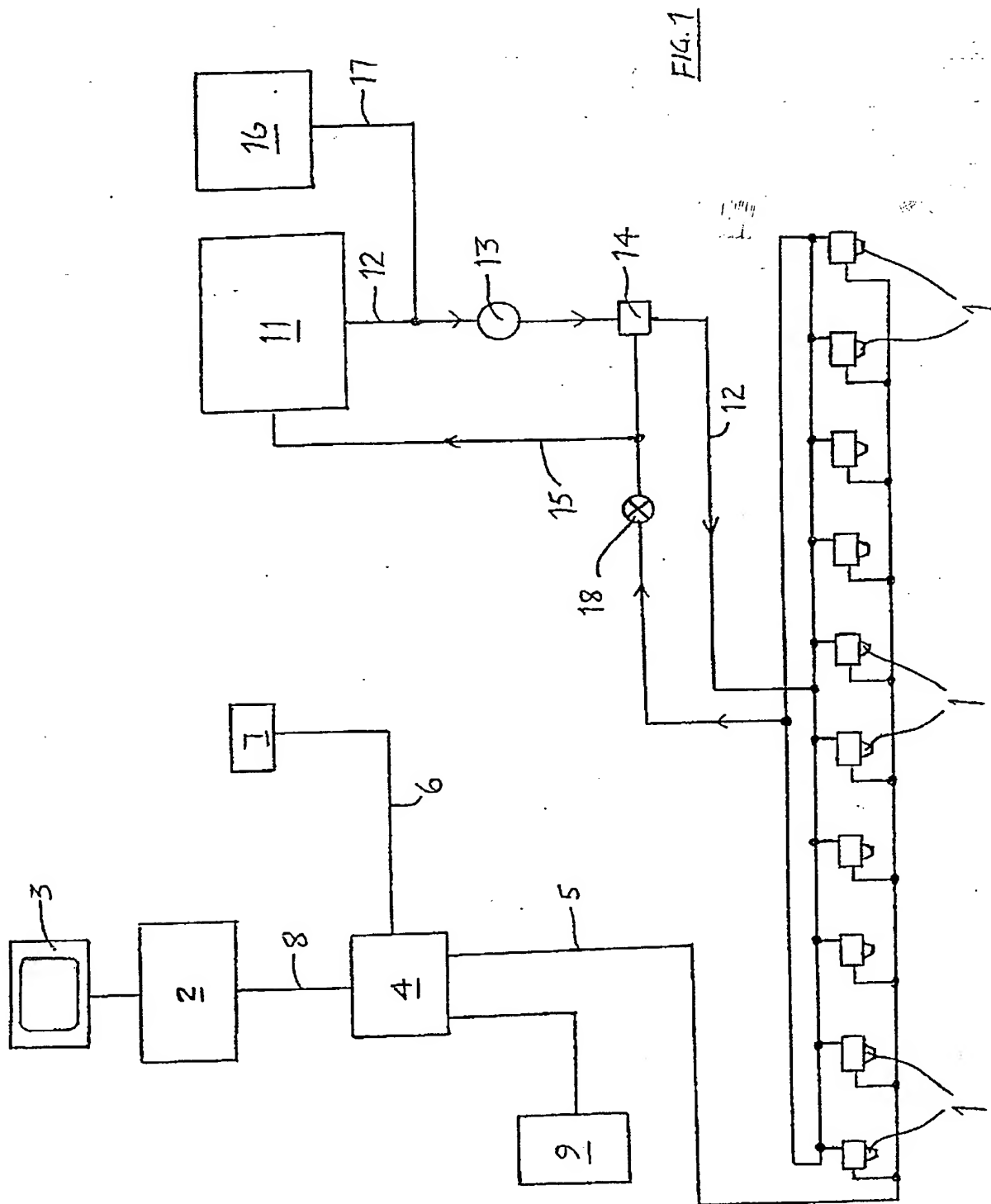


FIG. 1

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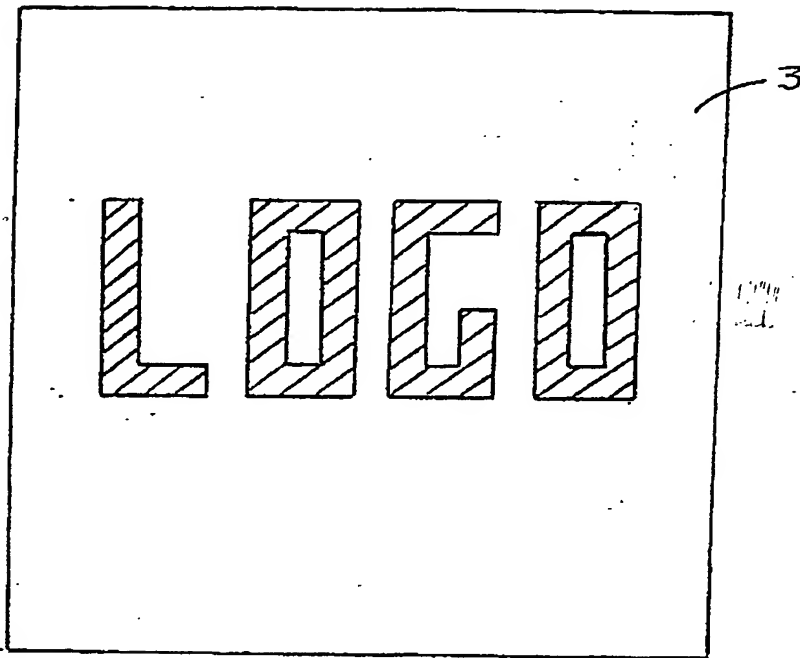


FIG. 2A

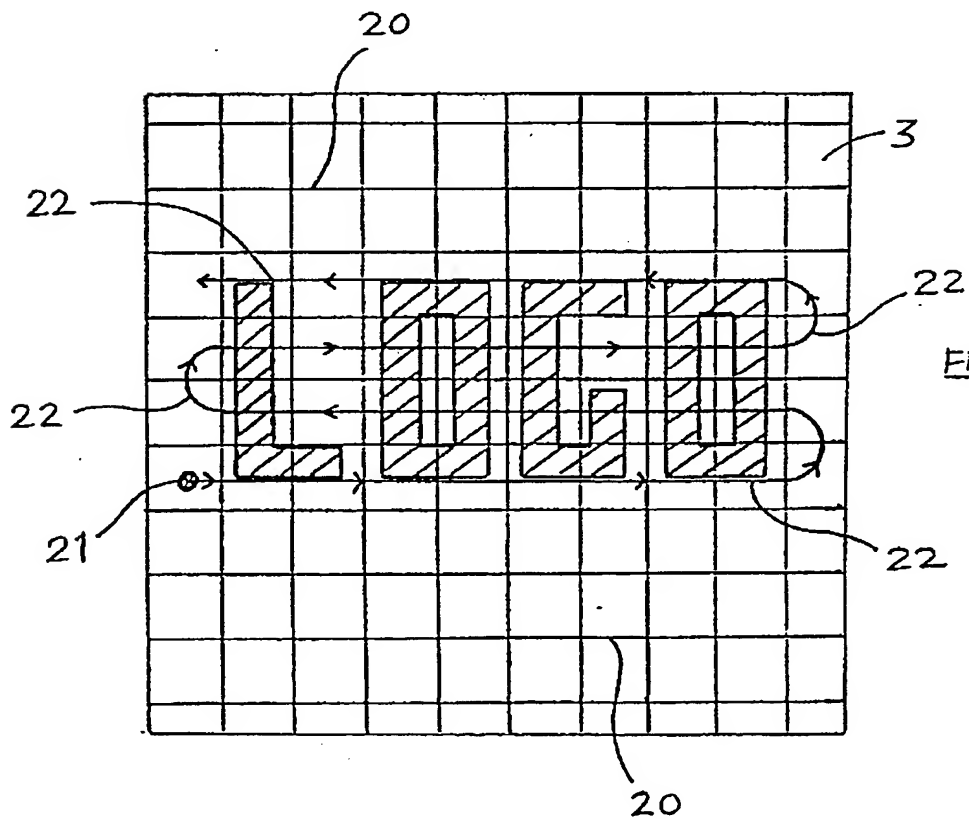


FIG. 2B

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LANDSCAPE MARKING

DESCRIPTION

5 This invention relates to marking a landscape to provide thereon a pattern for advertising, identification, warning, information, ornamental or like purposes when viewed from a distance, for instance, from the air.

10

 Throughout this specification, the term "landscape" is used to mean not only land, such as, ground or soil, but also any covering therefor, for example, natural coverings in the form of, say, vegetation, such as, grass, crops or trees, growing on
15 the ground or soil, or artificial coverings in the form of, say, concrete, asphalt, synthetic plastics surfaces or the like applied thereto, as well as rooftops and like surfaces.

20

 Accordingly, one aspect of the invention provides a method of marking a landscape to provide a pattern thereon, comprising traversing the landscape to be marked with operable means arranged to apply marking
25 material thereto in a given sequence and operating said means as it traverses the landscape to apply marking material thereto in said sequence, to provide a predetermined pattern thereon.

30

 Another aspect of the invention resides in apparatus for marking a landscape to provide a pattern thereon, comprising operable means which is arranged to traverse a landscape to be marked and to apply marking material to the landscape in a given sequence such
35 that, in use, operation of said means as it traverses

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the landscape causes marking material to be applied to the landscape in a predetermined pattern thereon.

5 Operation of the operable means in any given sequence is preferably controlled by a programmed or programmable control device, such as, a computer, which can be used to store various predetermined patterns for application to the landscape.

10 The sequence in which marking material is applied to the landscape may also be dependent upon the distance of traverse of the operable means with respect thereto and such distance can be monitored by any suitable means, such as, a Doppler-type or radar
15 sensor, connected to the control device.

 The nature of the material for marking the landscape will depend upon the landscape itself. For instance, if the landscape to be marked with a pattern
20 is a field of crops, then a desiccant, constituting the marking material, may be used, in which case, the crops to which the desiccant are applied will become a different tone or colour to that of the remainder of the crops to which the desiccant has not been applied,
25 such that the contrast in tone or colour between the desiccant treated and untreated crops provides the desired pattern on the effective surface of the field.

 Alternatively, a field might be planted with, say,
30 two different types of crop seed, with one of the seeds, namely, that constituting the marking material, be applied to the soil in accordance with the invention, whereby, on growth, it provides the required pattern by tone and/or colour contrast with the other,
35 background crop.

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Further, a field might again be planted with two different crop seeds, with both being distributed as evenly as possible over the whole area of the field. In this case, however, and at the most suitable time
5 during the growth of the two types of crop seed, a selective chemical, as the marking material, may be applied to the crops to treat only one of the growing crops to provide the required pattern on the field.

10 Where the landscape to be marked with a pattern is generally grass, such as, a sports field, then paint, dye or other suitable colourant in any combination of desired colours, may be applied thereto as the marking material. This is particularly applicable in
15 professional sport where sponsorship logos are sometimes applied to a playing surface, whether it be natural (grass) or synthetic (plastics).

20 Similarly, colourant materials may be applied to other landscape surfaces, such as, asphalt and concrete, this particular aspect of the invention being important in the marking of, say, parking lots, helicopter pads and the like.

25 In a preferred embodiment of the inventive method and apparatus, which has particular agricultural and horticultural applications, the operable application means arranged to cause the marking material to be applied to the landscape in a given sequence, comprises
30 a row of nozzles whose operation is controlled selectively by a computer or other control device. The nozzles are preferably mounted along a sprayer boom of standard length which, in turn, is mounted on the rear of a vehicle, such as, a four-wheel drive vehicle or
35 tractor, transversely thereof, with the computer or

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other programmable nozzle control device being mounted, say, in the cab of that vehicle. Advantageously, the nozzles are operable by respective solenoid valves actuatable selectively by programmed instructions from the computer or other control means as the vehicle traverses the landscape to be marked, thereby applying the marking material, such as, a desiccant or other chemical, to the landscape to provide the predetermined pattern thereon.

10

It is to be appreciated that the term "marking material" does not necessarily mean a material which marks directly itself, such as a paint, dye or other colourant, but one which can indirectly provide a mark on a landscape, such as, the action of a desiccant applied in a predetermined pattern to a field to provide the necessary contrast of tone and/or colour between so-treated and untreated crops growing thereon.

20

In order that the invention may be more fully understood, a preferred embodiment in accordance therewith will now be described by way of example and with reference to the accompanying drawings in which:

25

Figure 1 is a schematic diagram of apparatus in accordance with the invention; and

30

Figures 2A and 2B are representations illustrating stages for putting the inventive method into effect using the apparatus of Figure 1.

35

Referring firstly the Figure 1 of the drawings, apparatus for marking a landscape of a field of crops with a predetermined pattern, comprises a plurality, in this case, ten, of nozzles 1 mounted in a linear row

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upon a boom (not shown) which, in turn, is mounted upon a four-wheel drive vehicle or tractor, to extend transversely of the direction of travel thereof. Respective solenoid valves (also not shown) are
5 associated with the nozzles 1 to control the operation thereof. In turn, the solenoid-operable valves, and hence the associated nozzles, are controlled to operate in a given sequence, by means of computer or other control device 2 installed in the cab of the four-wheel
10 drive vehicle or tractor, in dependence upon the predetermined pattern to be applied to the crops.

The computer or other control device is provided with a visual monitor 3, such as, a VDU or LED or LCD
15 screens and an input/output control 4 and associated relay bank (not shown) for controlling the solenoid valves via appropriate wiring 5.

Connected to the control 4 via conductors 6 is an
20 operator control unit 7 which is linked, along with the control 4, to the computer 2 via conductors 8.

To minimise space occupied by the apparatus, the computer 2, monitor 3, control 4 and control unit 7 may
25 be provided in a common housing.

Also connected to the computer 2 via the control 4 is a distance monitoring device 9 which, in this particular case, is in the form of a radar or Doppler-type sensor.
30

A tank 11 contains a marking material, in this particular case, a desiccant, which is supplied to the nozzles 1 by a feed line 12 provided with a pump 13 and
35 a pressure regulator 14. A return line 15 for the

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desiccant connects the nozzles 1 to the desiccant tank 11 via a stopcock 18.

5 A tank 16 containing clean water for flushing the lines 12, 15 and associated nozzles 1, is connected to the feed line 12 via a pipe 17 upstream of the pump 13.

10 Figure 2A is a diagrammatic representation of the visual display 3 with a predetermined pattern in the form of the word "LOGO" displayed thereon, which pattern is to be applied to the field of crops.

15 This pattern is generated by the computer 2 or other control device from a selection of predetermined patterns provided from suitable software associated therewith.

20 If another form of control device, rather than the computer 2, is used, such may be programmed via EPROMS or similar devices to provide the predetermined pattern(s). Inputs would be provided for the EPROMS, along with, say, a small display in the form of a LED or LCD screen.

25 Figure 2B is a diagrammatic representation of the predetermined pattern "LOGO" displayed on the monitor 3 but with a reference grid 20 superimposed thereon. The grid and pattern may be scaled up or down to suit the particular area of the field of crops to be marked with
30 the pattern and the cursor 21 represents the vehicle upon which the apparatus is mounted and which is arranged to be standard along a given path 22 which traverses the grid 20 and associated LOGO pattern, in the case, four times. As the vehicle is steered to
35 traverse the field, distance signal pulses received

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from the distance monitoring sensor 9 move the cursor in a corresponding manner across the reference grid 20.

5 As the cursor 21 traverses the grid 20 in accordance with the monitored distance traversed by the vehicle, its positional relationship with respect thereto, and hence the predetermined LOGO pattern to be marked on the field, determines which nozzles are to be operated at any given position, in order to apply the
10 desiccant to the crops in the required manner to provide the LOGO pattern to the crop surface.

At the end of each traverse of the grid 20, and hence the field, a marker, such as, a dye, is put down
15 as operation of the apparatus is stopped, either manually by the operator or automatically. After the vehicle has been turned around through 180° to commence the next traverse of the field, the operator commences operation of the apparatus at the previously put down
20 marker.

After four traverses of the field, the LOGO pattern is applied to the crops in the form of the desiccant marking material. Although not immediately
25 evident, the pattern soon becomes visible as the desiccant-treated crops turn a different tone to the untreated crops.

In use of the apparatus, the angle of application
30 of the desiccant, or other suitable marking material, such as, a dye, selective herbicide, residual herbicide or growth regulator, with respect to the crops or other landscape surface, can be adjusted in dependence upon actual working conditions. For instance, if the
35 prevailing weather conditions are, say, windy, then the

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nozzles 1 can be directed more downwardly than under normal spray conditions, to prevent the marking material, such as, the desiccant, from spreading unnecessarily to areas of landscape which must remain untreated.

The feed and return lines 12 and 15 provide a recirculatory system for ensuring that marking material is readily available at the nozzles 1 at the commencement of the marking operation, as well as to facilitate flushing of the associated pipes. The pressure regulator 14 enables all the nozzles 1 to be operated in a given sequence or in unison by signals from the computer or other control device 2, whilst also maintaining a substantially constant pressure.

The distance monitoring radar sensor 9 mounted on the vehicle, generates pluses in relation to the distance covered thereby, whilst the input/output control 4 is arranged to process on/off signals from the operator control unit 7, input signal pulses from the radar sensor 9 and operation of the associated relays which, in turn, actuate the solenoid valves for operating the nozzles 1.

Data may be inputted into the computer or other control device 2 either directly from a keyboard or via a digitiser from, say, a video, scanner, disc camera of the like and is then modified using conventional graphics software. If necessary, text can be added as required to each design of pattern. Alternatively EPROM input may be used, as described above.

The inputted graphics can be adjusted to suit the particular location of the landscape, as well as its

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slope, size and other parameters. A so-called "working
file" is created by slicing the so-formed graphics into
strips representing the approximate working width of
the boom, which is then scanned to produce control
5 codes.

An operator then loads the appropriate programme
into the on-vehicle computer or other control device 2,
together with the relevant working file. Then, the
10 vehicle is positioned at one corner of the landscape
area to the marked and inputs the start signal via the
control unit 7 before moving off. As the boom travels
over the landscape being marked, the distance covered
is monitored by the radar sensor 9 and inputted to the
15 computer or other control device 2 which scans the
working file at the appropriate rate of movement
dependent upon the travel of the vehicle. As a
consequence, the nozzles 1 are operated in the given
sequence to build up the predetermined pattern on the
20 landscape.

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CLAIMS

1. A method of marking a landscape to provide a pattern thereon, comprising traversing the landscape to be marked with operable means arranged to apply marking material thereto in a given sequence and operating said means as it traverses the landscape to apply marking material thereto in said sequence, to provide a predetermined pattern thereon.
2. A method according to claim 1, wherein operation of the operable means in a given sequence is controlled by a programmed or programmable control device, such as, a computer, for storing the predetermined pattern(s).
3. A method according to claim 1 or 2, wherein the distance traversed by said operable means is monitored, with the sequence in which marking material is applied to the landscape being dependent upon such monitored distance.
4. A method according to claim 3, wherein the distance traversed by said operable means is monitored by a radar or Doppler-type sensor or other distance monitoring means.
5. A method according to claim 2, 3 or 4, wherein said operable means comprises a row of nozzles whose operation is controlled selectively by the computer or other control device.
6. A method according to claim 5, wherein the row of nozzles is arranged transversely of the direction of traverse of said operable means.

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7. A method accordingly to claim 5 or 6, wherein the nozzles are operable by respective valves actuatable selectively by the computer or other control device.

5 8. Apparatus for marking to provide a pattern thereon, comprising operable means which is arranged to traverse a landscape to be marked and to apply marking material to the landscape in a given sequence such that, in use, operation of said means as it traverses
10 the landscape causes marking material to be applied to the landscape in a predetermined pattern thereon.

9. Apparatus according to claim 8, wherein operation of the operable means in a given sequence is
15 controllable by a programmed or programmable control device, such as, a computer, for storing the predetermined pattern(s).

10. Apparatus according to claim 8 or 9 including
20 means arranged to monitor the distances traversed by said operable means, the sequence in which marking material is applied to the landscape by said operable means, being dependent upon such monitored distance.

25 11. Apparatus according to claim 10, wherein said distance monitoring means comprises a radar or Doppler-type sensor.

12. Apparatus according to claim 9, 10 or 11, wherein
30 said operable means comprises a row of nozzles whose operation is controllable selectively by the computer or other control device.

13. Apparatus according to claim 12, wherein the row
35 of nozzles is arranged transversely of the direction of

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traverse of said operable means.

14. Apparatus according to claim 12 or 13, wherein the
nozzles are operable by respective valves actuatable
5 selectively by the computer or other control device.

15. A method of marking a landscape of vegetation to
provide a predetermined pattern thereon in accordance
with any of claims 1 to 7, wherein the marking material
10 is a desiccant, selective herbicide, residual
herbicide, growth regulator or dye.

16. A method of marking a landscape substantially as
hereinbefore described.

15 17. Apparatus for marking a landscape substantially as
hereinbefore described with reference to the
accompanying drawings.

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Patents Act 1977
Examiner's report to the Comptroller under
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Relevant Technical fields

(i) UK CI (Edition K)

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 3/30; 2/11

Databases (see over)

(i) UK Patent Office

(ii)

Search Examiner

F G MILES

Date of Search

5 OCTOBER 1992

Documents considered relevant following a search in respect of claims

1, 8

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
Y	GB 2187419 A (DAWSON ELLIS)	1, 8 at least
Y	GB 2036645 A (MIELKE)	1, 8 at least
Y	US 4501038 A (OTTING)	1, 8 at least
Y	EP 0036295 A2 (PRINTOS)	1, 8 at least

SF2(p)

HD - doc99\fil000388

-16-

Category	Identity of document and relevant passages	Relevant to claim(s)

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